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10/668,167	09/24/2003	Kelly Alan Stonger	60497.000015	5213

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EXAMINER	
POLYZOS, FAYE S	
ART UNIT	**PAPER NUMBER**
2878	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/668,167	Applicant(s) STONGER ET AL.
	Examiner Faye Polyzos	Art Unit 2878

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 September 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *4/30/04*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-3, 6-11 and 13-16 are rejected under 35 U.S.C. 102(b) as being anticipated by *Stark et al (US 6,403,964 B1).*

Regarding claim 1, *Stark* discloses a method of generating a detector position map for an array of detectors (11), the detector position map comprising a map which maps measured coordinates from a detection event to the detector in the array which detected the detection event (Fig. 1 and col. 6, lines 1-38), the method comprising the steps of: illuminating an array of detectors (11) with a source of radiation (16) to generate a histogram, the histogram comprising an event count as a function of two dimensions (col. 2, lines 38-48), the two dimensions corresponding to a face of the array of detectors, wherein the histogram comprises a plurality of first peaks, modifying the histogram to comprise a plurality of second peaks, wherein the second peaks have a greater degree of isolation from each other than the first peaks, for each detector, determining a region on the detector position map which corresponds to the detector, each region being based on a position of one of the second peaks (col. 8, lines 53-67, col. 9, lines 1-28 and col. 10, lines 15-38).

Regarding claim 2, *Stark* discloses modifying the histogram to comprise a plurality of second peaks comprises compressing the histogram by averaging adjacent pixels of the histogram (col. 6, lines 24-49 and col. 8, lines 42-65).

Regarding claim 3, *Stark* discloses the step of modifying the histogram to comprise a plurality of second peaks comprises applying a low pass filter to the compressed histogram to produce a smoothed histogram (col. 4, lines 1-14, col. 8, lines 66-67 and col. 9, lines 1-10).

Regarding claim 6, *Stark* discloses eliminating a number of the second peaks in excess of the number of detectors in the array (col. 3, lines 55-67, col. 5, lines 66-67 and col. 6, lines 1-6).

Regarding claim 7, *Stark*s discloses eliminating the number of second peaks in excess of the number of detectors in the array comprises the steps of: (a) determining the number of second peaks in excess of the number of detectors in the array; (b) identifying the pairs of second peaks having the shortest distance between them; (c) determining which of the pair has a lower value; (d) deleting the lowest second peak in the pair; and repeating steps (b), (c) and (d) until the number of remaining second peaks equals the number of detectors in the array (col. 9, lines 11-50).

Regarding claims 8-9, *Stark* discloses assigning each second peak to a detector, comprises steps of sorting the second peaks according to a first of two dimensions; sorting the second peaks according to a second of two dimensions; and matching each second peak to a detector (col. 2, lines 38-48, col. 3, lines 18-22, col. 5, lines 57-65 and col. 4, lines 45-62).

Regarding claims 10-11, *Stark* discloses determining a region on the detector position map comprises the step of determining a closest second peak for each coordinate pair and a coordinate pair to one of the detectors in the array based on the detector position map (col. 6, lines 26-57).

Regarding claim 13, *Stark* discloses the first peaks have a first average cross sectional area which is greater than a second average cross sectional area of the second peaks (col. 8, lines 53-67 and col. 9, lines 1-10).

Regarding claim 14, *Stark* discloses a method of generating a detector position map for an array of detectors (11), the detector position map comprising a map which maps measured coordinates from a detection event to the detector in the array which detected the detection event (Fig. 1 and col. 6, lines 1-38), the method comprising the steps of: illuminating an array of detectors (11) with a source of radiation (16) to generate a histogram, the histogram comprising an event count as a function of two dimensions (col. 2, lines 38-48), the two dimensions corresponding to a face of the array of detectors, wherein the histogram comprises a plurality of peaks; for each of the peaks, determining a pair of coordinates describing the position of the peak; sorting each of the peaks according to their coordinates such that each of the peaks is associated with one of the detectors; and for each detector, determining a region on the detector position map which corresponds to the detector (col. 8, lines 53-67, col. 9, lines 1-28 and col. 10, lines 15-38).

Regarding claim 15, *Stark* discloses the sorting step is carried out with a bubble sort type routine (col. 6, lines 1-14).

Regarding claim 16, *Stark* discloses a method of generating a detector position map for an array of detectors (11), the detector position map comprising a map which maps measured coordinates from a detection event to the detector in the array which detected the detection event (Fig. 1 and col. 6, lines 1-38), the method comprising the steps of: illuminating an array of detectors (11) with a source of radiation (16) to generate a histogram, the histogram comprising an event count as a function of two dimensions (col. 2, lines 38-48), the two dimensions corresponding to a face of the array of detectors; modifying the histogram to comprise a plurality of isolated peaks; and for each detector, determining a region on the detector position map which corresponds to the detector, each region being based on a position of one of the isolated peaks (Fig. 1 and col. 8, lines 17-67, col. 9, lines 1-28 and col. 10, lines 15-38).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Stark et al (US 6,403,964 B1)* as applied to claim 3 above, and further in view of *Dewaele et al (US 5,986,279 A).*

Regarding claim 4, *Stark* discloses of modifying the histogram to comprise of a plurality of peaks by applying a filter to compress the histogram in order to

produce a smooth histogram (col. 4, lines 1-14, col. 8, lines 66-67 and col. 9, lines 1-10). *Stark*s does not disclose of a Laplacian type histogram. *Dewaele* discloses applying a Laplacian filter to the smoothed histogram to produce a Laplacian histogram (col. 7, lines 47-67 and col. 8, lines 1-8). *Dewaele* teaches In order to cope with poor detectability; the sequence of profiles is next submitted to a peak enhancement step by means of a Laplacian filter (col. 7, lines 47-67). Therefore, it would have been obvious to modify the method suggested by *Stark* to incorporate a Laplacian filter to the detector position map, as disclosed supra by *Dewaele*, to allow for a more versatile apparatus.

Regarding claim 5, *Dewaele* discloses modifying the histogram to comprise a plurality of second peaks comprises modifying regions of the Laplacian histogram having values less than a threshold value to produce a thresholded histogram (col. 9, lines 55-67).

5. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Stark et al (US 6,403,964 B1)* as applied to claim 1 above, and further in view of *Sterns et al (US 5,272,343 A).*

Regarding claim 12, *Stark*s discloses of SPECT views (col. 1, lines 53-67 and col. 2, lines 1-23). Starks does not specifically disclose of execution by a position emission tomography scanner. *Sterns* discloses method may be executed by a positron emission tomography scanner (col. 2, lines 18-31). *Sterns* teaches a position emission tomographic scanner receives coincidence data packets containing timing data obtained from an orbiting source, which receives a signal indicative of the source's position in its orbit, which stores the

timing information in one of two sonogram calibration arrays (col. 2, lines 18-31). Therefore, it would have been obvious to modify the method suggested by *Stark,* to incorporate a position emission tomography scanner to generate a detector position map to determine region on the detector position map corresponding to the detector, as disclosed supra by *Sterns*, to allow for a more versatile apparatus.

6. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Stark* et al (US 6,403,964 B1) in view of *Dewaele et al (US 5,986,279 A).*

Regarding claim 17, *Stark* discloses a method of generating a detector position map for a positron emission tomography scanner, the method comprising the step of: illuminating an array of detectors with a source of radiation to generate a histogram, the histogram comprising an event count as a function of two dimensions; applying a low pass filter to the histogram to produce a smooth histogram; mapping peaks from the histogram to respective detectors in the array of detectors and generate a detector position map based on locations of the peaks (col. 8, lines 53-67, col. 9, lines 1-28 and col. 10, lines 15-38). *Stark* does not of applying a Laplacian filter to the smoothed histogram. *Dewaele* discloses applying a Laplacian filter to the smoothed histogram to produce a Laplacian histogram; applying a threshold criterion to the Laplacian histogram to produce a thresholded histogram (col. 7, lines 47-67 and col. 9, lines 55-67). *Dewaele* teaches a threshold profile shows a marked presence of peaks according to gridlines; however, spurious peaks due to diagnostic detail may still be present (col. 9, lines 55-67). Therefore, it would have been obvious

to modify the method suggested by Spark to incorporate a method of applying Laplacian filter to the smoothed histogram, as disclosed supra by *Dewaele*, to allow for a more versatile apparatus.

7. Claims 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Young et al ("FPGA Based Front-End Electronics for a High Resolution PET Scanner", IEEE Transactions on Nuclear Science, vol. 47, no. 4 (2000))* in view of *Stark* et al (US 6,403,964 B1).

Regarding claim 18, *Young* discloses a system for generating a detector position map for an array of detectors, the detector position map which maps measured coordinates from a detection event to the detector in the array which detected the detection event, the system comprising: a memory; a processor which: receives a plurality of event data packets, each event data packet comprising a coordinate pair and stores the plurality of event data packets (pgs. 1676-1677); for each detector, determine a region on the detector position map which corresponds to the detector, each region being based on a position of one of the second peaks; and stores each region in memory to create a detector position map (See Generally Figs. 2, 5 and 7-8). *Young* does not disclose of event packets in the form of a histogram. *Stark* discloses of illuminating an array of detectors with a source of radiation to generate a histogram, wherein the histogram comprising an event count as a function of two dimensions, the two dimensions corresponding to a face of the array of detectors, wherein the histogram comprises a plurality of first peaks; modifies the histogram to comprise a plurality of second peaks, wherein the second peaks have a greater degree of

isolation from each other than the first peaks (col. 8, lines 53-67, col. 9, lines 1-28 and col. 10, lines 15-38).. *Stark* teaches histograms are addressed by the highest n bits of x position and the highest m bits of y position wherein for each event with particular position x and y, particular histogram is chosen depending on position and the counter of that histogram is increase, depending on the energy (col. 8, lines 57-65). Therefore, it would have been obvious to modify the apparatus suggest by *Young*, to utilize a histogram, as disclosed supra by *Stark*, to allow for a more versatile apparatus.

Regarding claim 19, *Young* discloses a system for generating a detector position map for an array of detectors, the detector position map which maps measured coordinates from a detection event to the detector in the array which detected the detection event, the system comprising: a memory; a processor which: receives a plurality of event data packets, each event data packet comprising a coordinate pair and stores the plurality of event data packets (pgs. 1676-1677); for each detector, determine a region on the detector position map which corresponds to the detector, each region being based on a position of one of the second peaks; and stores each region in memory to create a detector position map (See Generally Figs. 2, 5 and 7-8). *Young* does not disclose of event packets in the form of a histogram. *Stark* discloses of illuminating an array of detectors with a source of radiation to generate a histogram, wherein the histogram comprising an event count as a function of two dimensions, the two dimensions corresponding to a face of the array of detectors, wherein the histogram comprises a plurality of first peaks; the plurality of first peaks having a

first average cross section; modifies the histogram to comprise a plurality of second peaks, wherein the second peaks have a greater degree of isolation from each other than the first peaks (col. 8, lines 53-67, col. 9, lines 1-28 and col. 10, lines 15-38). *Stark* teaches histograms are addressed by the highest n bits of x position and the highest m bits of y position wherein for each event with particular position x and y, particular histogram is chosen depending on position and the counter of that histogram is increase, depending on the energy (col. 8, lines 57-65). Therefore, it would have been obvious to modify the apparatus suggest by *Young*, to utilize a histogram, as disclosed supra by *Stark*, to allow for a more versatile apparatus.

Regarding claim 20, *Young* discloses the detector position map is adapted to be used with a position emission tomography scanner (pp. 1676).

Regarding claim 21, *Young* discloses the process is further adapted to eliminate a number of second peaks in excess of the number of detectors in the array (pp. 1677).

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Faye Polyzos whose telephone number is 571-272-2447. The examiner can normally be reached on Monday thru Friday from 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Porta can be reached on 571-272-2444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

10. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

FP

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